

PESTS THAT CHANGED THE FORESTS OF FUNDY NATIONAL PARK

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ABSTRACT

This report describes the condition of the major tree species of Fundy National Park with a brief description of the most serious pests and conditions. Tables list the organisms found in surveys conducted by the Forest Insect and Disease Survey and the species captured in light traps, together with hosts attacked and pertinent remarks.

RESUMÉ

Ce rapport fait le bilan des plus importants ravageurs forestiers dans le Parc National Fundy. On y présente sous forme de tableaux les organismes repérés lors d'enquêtes dirigées par le Relevé des Insectes et Maladies des Arbres, les insectes capturés dans des pièges lumineux, ainsi que les hôtes attaqués et les observations appropriées.

INTRODUCTION

Prehistorically, the species composition of the forests of the Maritimes Region has been shaped by climate, site, fire, insects, and diseases. After the arrival of European settlers, cutting, clearing, and burning practices exerted new influences as did the importation of new insects and diseases.

The forests of Fundy National Park are no different. They are home for a great many different organisms that usually maintain a certain balance. However, when, for various and often not fully understood reasons, conditions change, populations of insects or diseases may fluctuate widely. To gain a total understanding of the events and predisposing factors leading to these fluctuations would require a more complete knowledge than is presently ours. However, we do know enough to have some perspective on current forest conditions.

Some of the major pests that shaped the forests and their recent history in the Park are discussed briefly in this report. Each of the major forest tree species has been affected: balsam fir by the spruce budworm and the balsam woolly adelgid; spruce by the budworm and the spruce beetle; birch by birch dieback; and beech by beech bark disease. Some potentially dangerous species, such as the winter moth, have been brought under control by other forces in the insect world. The potential of some pests such as the gypsy moth, which up to 1987 has not arrived in the Park, is yet to be realized but the possibility for damage is there and should establishment occur could be the cause of another upheaval in the balance of nature.

Insects do not maintain themselves at a constant level. Their populations fluctuate in response to the many forces of nature affecting survival. These fluctuations can be illustrated by the results of light trap catches of the spruce budworm in Fundy National Park during the last 34 years (Table 1).

Table 1. Summary of spruce budworm light trap catches* Fundy National Park, 1953 to 1986

Year	Number of adults	Year	Number of adults
1953	874	1970	22,960
1954	257	1971	24,092
1955	116	1972	2,183
1956	4,012	1973	4,988
1957	1,204	1974	20,896
1958	211	1975	19,734
1959	0	1976	11,808
1960	14	1977	41,671
1961	3	1978	7,031
1962	2	1979	4,865
1963	4	1980	3,081
1964	571	1981	2,265
1965	586	1982	36,818
1966	Not available	1983	6,106
1967	16,206	1984	4,913
1968	13,969	1985	250
1969	362,767	1986	194

*Catches like these provide some information on local conditions, but because each trap is part of a network extending across the Region their chief value is in providing data on overall population levels, flight activity, and population trends.

MAJOR PESTS OF SOME COMMON TREE SPECIES

Fir and Spruce

The spruce budworm

The spruce budworm, Choristoneura fumiferana (Clem.), is native to North America and is the insect that causes by far the most damage to fir forests of the Region. Outbreaks erupt periodically and extend over vast areas. The variables initiating these outbreaks are not completely understood but studies on population dynamics are continuing. Past outbreaks began in New Brunswick in 1770, 1806, 1878, 1912, and 1949. The present outbreak, which began in 1969, is part of an epidemic that started simultaneously

from Manitoba and Ontario to Newfoundland, and is the most widespread and destructive budworm infestation in this century.

Budworm populations began increasing in New Brunswick in the 1940s and larvae were found in Albert County in 1949. By 1952 very light defoliation occurred throughout the Park. In 1953, defoliation was moderate, then light in 1954 and 1955. In 1956 and 1957, although generally light, one area suffered moderate to severe defoliation. Only light defoliation was recorded in 1958 and none was observed during aerial surveys from 1959 to 1967. In 1967, defoliation in the Province decreased to levels lower than any recorded since the early 1950s. However, egg-mass counts in and adjacent to the Park indicated severe defoliation for 1968. This defoliation materialized and occurred again in 1969. In 1970, the Park was sprayed and only light defoliation occurred but egg-mass counts indicated high hazard for 1971. The spray in 1971 provided excellent foliage protection. Severe defoliation was predicted for 1972 and the Park was included in the spray program but foliage protection was poorer than in previous years and considerable moderate and severe defoliation occurred. The forecast for 1973 indicated that the central region of the Park was still in a generally high hazard condition. In 1973, the area of defoliation in southern New Brunswick decreased and moderate defoliation was noted in the northwest corner of the Park. Surveys for egg masses and tree hazard identified an area on the eastern boundary as being in a high hazard category. The block was sprayed in 1974 and about 60-70% of the foliage crop was saved. For the 4th consecutive year overall populations within the Park decreased and current damage reflected this trend but egg-mass counts in August of that year indicated high hazard over 5600 ha. The Park was last sprayed in 1975.

The spruce budworm outbreak continued unabated for several more years. In 1984, the population began to decline and by

1986 there was a 54% decrease from the 1983 levels of moderate and severe defoliation. Within Fundy National Park a large portion of the balsam fir component of the forest is dead and red spruce is declining with branch, upper crown, and some whole trees dead.

When a tree is weakened through defoliation it begins to deteriorate and becomes susceptible to attack by other organisms that normally would be of little consequence. For spruce and fir trees this group consists of sawyer beetles, bark beetles, bark weevils, ambrosia beetles, horntails wasps, sap rot, brown rot, white rots and *Armillaria* root rot. These organisms are now exerting considerable pressure on the surviving budworm damaged trees and will continue to do so as long as opportunities exist.

As the dead trees fall to the forest floor, the new forest is pushing upwards. Regeneration within the Park is plentiful, particularly in those areas where many trees were killed or severely damaged by the budworm. There is little evidence of current defoliation.

The balsam woolly adelgid

The balsam woolly adelgid, *Adelges piceae* (Ratz.) was introduced from Europe to North America in Nova Scotia about 1900, probably on nursery stock. It became established throughout Nova Scotia, Prince Edward Island, and the southern half of New Brunswick and at scattered locations throughout much of the remainder of the Province.

This insect attacks balsam fir and feeds on the thin walled living cells under the bark. In feeding, it introduces a salivary substance into the tissue causing an abnormal multiplication of cells. Both twigs and stems are attacked. When twigs are attacked they become thickened and stubby, a condition called "gouting." On the trunk or stem, the sapwood beneath the infested bark becomes brown and brittle. Many trees in a heavily infested stand die within one season.

In the 1946 Annual Report of the Forest Insect Survey, the following comment was made: "This is the most injurious insect in the Maritime Provinces at the present time, since it either destroys its host or impairs its value commercially by reducing the quality of lumber sawn from infested trees" (Reeks, W.A., R.S. Forbes, and F.G. Cuming 1946).

Attacks by the insect have persisted in parts of the Region for many years, with twig attack being the usual expression in coastal areas and stem attack in inland locations. Losses, in terms of tree growth, mortality, and decreased wood quality, have been substantial. Infestations, particularly in inland New Brunswick, have been much reduced in recent years as a result of low winter temperatures and death of host trees, killed by the spruce budworm.

In Fundy National Park, twig attack has been general but stem attack rare. Although some trees have died, the overall effect of this insect on balsam fir within the Park has been limited.

Beech

Beech bark disease

The beech bark disease is the result of a complex interaction between a scale insect, Cryptococcus fagisuga Linding, and a fungus, Nectria coccinea var. faginata Lohm., Wats. and Ayers. The fungus is dependent on attack by the insect before infection occurs.

Beech, an attractive tree with smooth, gray bark when healthy, is hard to find in the Maritimes without pockmarked or gnarly, cankered stems, often covered with the white woolly substance secreted by the insect. An attack by a combination of the insect and the fungus cankers, deforms and often kills trees.

The disease was introduced to North America on European beech nursery stock prior to 1890 at, or near, Halifax, N.S. By 1925, it was present throughout mainland Nova Scotia and the same year was found in Prince Edward Island. The first infestation on Cape Breton Island was found in 1926. In New Brunswick, the disease was found for the first time in

1927 at locations in Westmorland and Albert counties, and spread in a north-westward direction within the Province. By 1980, beech was affected at various levels of intensity throughout the Maritime Provinces (Magasi and Newell 1982).

The condition of beech in the Park is similar to that in other parts of the Region. A typical condition is that of the beech at the Chignecto Camp Ground. Studies in 1969 showed that all of the beech examined were cankered, 34% of the beech examined were dead, and 64% of the still living trees had crown dieback ranging from 1 to more than 50% of their crowns dead. (No assessments have been made since 1969 within the Park boundaries.) On average, figures for the Maritimes in 1980 showed that 6% of the trees were dead, 83% of the living trees were cankered, and various degrees of crown dieback were present on more than 75% of the living trees (Magasi 1980).

It is unlikely that the condition of beech will improve within the foreseeable future. Populations of the scale insect are partially controlled by a predator, the twicestabbed lady beetle, and winter temperatures of -37°C . These factors have, to the present, brought about only limited and temporary control.

Birch

Birch dieback of the past and pests of the present

Yellow, and to a much lesser extent, white birch suffered severe losses in the 1930s and 1940s caused by a condition referred to as birch dieback. It was estimated that "in Canada at least 1 million cords were killed in 1939 alone" (Brown 1940). In the 1946 Annual Report of the Forest Insect Survey the following comment was recorded "Analysis of permanent sample plots in New Brunswick by G.W. Barter shows that the percentage of dead and dying white and yellow birch trees (diameter 12" and over at B.H.) ranged from 48 to 91 in 1946. Younger stands, particularly white birch, showed less injury."

The reason for this condition was never fully resolved. The bronze birch

borer, Agrilus anxius Gory, was found commonly throughout the affected areas but this insect then, as now, is of secondary importance. Some of the birch at that time was overmature or had been exposed by cutting operations, but die-back was also severe in some young undisturbed stands. By 1948, the general condition of birch began to improve but has since been subject to perennial attacks by several species of leafmining sawflies, Fenusa pusilla (Lep.), Heterarthrus nemoratus (Fall.), Profenusa thomsoni Konow and occasional but sometimes severe attacks by the birch skeletonizer, Bucculatrix canadensisella Cham., the birch casebearer, Coleophora serratella (L.) and the whitemarked tussock moth, Orgyia leucostigma (J.E. Smith). The insect which is the most common and persistent of the group is the birch leafminer, Fenusa pusilla (Lep.), an introduced species first recorded in North America in 1923. The birches of Fundy National Park have been affected by all of these problems as well as more recently (1979), by a condition which Forest Insect and Disease Survey reports referred to as "Deterioration of Birch." Symptoms of this problem are browning and premature leaf drop of white birch. A leaf spot fungus, Septoria betulina Pass., was the most commonly encountered organism but the bronze birch borer was also present in some areas. It appears that because other hardwoods such as alder, mountain-ash, and mountain maple were also affected, although to a lesser degree, atmospheric pollution may be responsible.

Maple

The maple decline

In recent years, many mature maples particularly those in urban settings, have been exhibiting symptoms of decline with twig, branch, upper crown, and sometimes whole tree mortality. The reasons for this are many - site disruption through roadbuilding, ditching, construction and soil compaction, contamination from road salt, automobile emissions, herbicides, industrial pollutants, etc.

In addition, insects such as the maple leafroller, the lesser maple spanworm, greenstriped mapleworm, saddled prominent and diseases such as anthracnose and leaf spots have weakened the trees over the last years. Maples in forests have suffered much less than urban trees, but have been affected. The maple trees within the Park have been subjected to attack by a variety of these organisms, but are in good condition generally, with reasonably good prospects for the future.

Hardwoods

The winter moth, Operophtera brumata (L.) was accidentally introduced from Europe and is known to have been present in Nova Scotia since the early 1930s. It attacks a wide variety of deciduous hosts and for a time caused considerable damage to red oak, apple, and a variety of shade and ornamental trees in municipalities. Over the years, its distribution expanded to include most of Nova Scotia, localities in Prince Edward Island, and in Westmorland, St. John, and Albert counties (including Fundy National Park) in New Brunswick.

Populations of this insect were brought under control by the introduction and release of several different species of parasites, two of which Cyzenis albicans (Fallen) and Agrypon flaveolatum (Grav.) became established and dramatically decreased host populations. Winter moth continues to be present in the same areas without any further expansion and at levels of low economic impact. In Fundy National Park, abandoned apple trees serve as one host for this pest. Overall, it has caused little damage but is likely to persist indefinitely.

Gypsy Moth

The gypsy moth, Lymantria dispar (L.) was introduced from Europe to the United States by a French scientist for the purpose of crossing the species with the silkworm and using the progeny for silk production. In the process, the insect accidentally escaped and eventually became established and asserted itself

as a very destructive pest in the hardwood, and to a limited extent, softwood forests of the northeastern States, Ontario, and Quebec.

In 1969, because of a northward movement of the outbreak, a program of pheromone-baited traps to capture adult male moths was initiated as an early warning system. Since 1971, many of the traps have been positive, including those placed in Fundy National Park, and as the outbreak in the United States expanded the overall number of males captured increased dramatically. Searches for egg masses were conducted each year but it was not until 1981 that the first egg masses were found in the Region, at four locations in New Brunswick and one in Nova Scotia.

In 1982, a small infestation was found in the Mohannes area southwest of St. Stephen. In 1987 severe defoliation of hardwoods occurred over a few hectares near Moores Mills, Charlotte County, N.B.

The insect is now present at locations in Charlotte and York counties, New Brunswick and in eight of the nine counties in western Nova Scotia. This is not the first time that gypsy moth was found in the Region. In 1936, a few egg masses, some larvae, and pupae were found near St. Stephen, Charlotte County, N.B. Populations remained localized but persisted for several years. An effort was made toward eradication and the insect disappeared from the Province.

Because of its wide distribution, the possibility that the pest will once again retreat from the Region seems less likely with each passing year. In Fundy National Park with its moderate coastal climate and the presence of acceptable tree species as hosts, it is conceivable that once introduced to the area the gypsy moth could become a permanent resident.

THE UPS AND DOWNS OF INSECT POPULATIONS (Monitoring population trends)

Information on fluctuations of insect populations is more than of scientific interest. Because many insects are

attracted to light, fluctuations can be measured by the use of light traps. Data accumulated by capturing, identifying, and counting moths daily for several years at the same location are used to indicate if populations of a specific insect are increasing, decreasing, or are stable. The light trap in Fundy National Park has been operated as a joint venture of the Forest Insect and Disease Survey and Park personnel since 1953. Spruce budworm catches from this trap (Table 1) are used to illustrate the type of information obtained. Catches are a function of several factors such as number of local and migrant moths, and outside influences (weather, disease, parasites). It is the long-term trend rather than the immediate that is predictable.

Relatively few of the hundreds of insects crawling, boring, biting on and in the trees become major tree pests on their own but each does its share and the combined effects add up. The same can be said for diseases. Often less spectacular, they are just as important, taking advantage of every opportunity that presents itself. Table 2 lists those insects and diseases that have been found throughout the years in Fundy National Park - with an indication of the trees they attack, their importance as part of the forest ecosystem, and their distribution in the Maritime Provinces.

SUMMARY

There are literally hundreds of species of forest insect and disease organisms in Fundy National Park. Most of these are maintained at a certain biological balance and never, or rarely, become conspicuous because of their abundance. Collections taken over the years by the Forest Insect and Disease Survey have detected many of these but because of their low "profile" were never mentioned in any of the reports.

This report is an attempt to summarize the impact and status of those organisms or conditions which have had, or are having, an important influence on the

changing species mix within the Park. Some of these are native but many have been introduced. Those who ponder how and why, especially if they have some interest in history may find the following excerpt interesting. It was taken from the Canadian Entomologist (Brown 1950) entitled "The Extralimital Distribution of some Species of Coleoptera." While it does not deal directly with forest insects it perhaps indicates that more could be encountered if a comprehensive search were made.

"There it was suggested that ships ballast has been an important source of European insects in Eastern Canada, and that erratic or immature distributional patterns shown by numerous species are evidence that they are introduced, rather than native, in America. Experience during the past decade has supported these opinions. Large quantities of ballast were landed at ports in the Maritime Provinces by ships seeking timber during the Napoleonic Wars, when Baltic sources were closed to British shipping. This seems to be the only historical event that will account for the fact that more European species of Coleoptera occur in that region than in any other part of North America. Nearly all of the European species that are, or were in the past, restricted to the region live on or in the soil or on low-growing plants. They live in habitats created by man and are most abundant in meadows and pastures. They avoid the forests, which are barriers to their spread, and some of the sedentary species are restricted by the forests to very small areas about old ports".

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Appendix 1

Insects and diseases collected from forest trees and shrubs in the area of Fundy National Park by the Forest Insect and Disease Survey. Tree species listed under host refer to collections made in the Park area. Comments on distribution have been limited to the Maritime Provinces

Organism	Host	Remarks
Ambermarked birch leafminer <u>Profenusa thomsoni</u> Konow	White birch Yellow birch	Probably an introduced species, distributed throughout the Maritime Provinces; specific to birch. Localized outbreaks occur occasionally.
Anthracnose <u>Kabatiella apocrypta</u> (Ell. & Ev.) Arx	Manitoba maple Red maple Sugar maple	Distributed throughout the Maritime Provinces, attacks the leaves of maple, causes leaf discoloration and when early heavy attack occurs, premature defoliation results which may lead to twig dieback, if sustained at high levels for a number of years.
Apple aphid <u>Aphis pomi</u> DeG.	Apple	Distributed throughout the Maritime Provinces, an European introduction specific to apple.
Armillaria root rot <u>Armillaria mellea</u> (Vahl ex Fr.) Kummer	Jack pine Sugar maple	Distributed throughout the Maritime Provinces, attacks a great variety of deciduous and coniferous trees and shrubs, responsible for high levels of mortality in forest stands where trees have been weakened by other factors such as spruce budworm defoliation and in young plantations where trees are struggling towards establishment.
Balsam fir sawfly <u>Neodiprion abietis</u> (Harr.)	Balsam fir	Distributed throughout the Maritime Provinces, attacks balsam fir and black, red, and white spruce. High populations, particularly on balsam fir, have occurred in some areas, mostly in Nova Scotia, and some tree mortality has resulted.
Balsam gall midge <u>Paradiplosis tumifex</u> Gagne	Balsam fir	Distributed throughout the Maritime Provinces, cyclical in abundance, attacks the current needles of balsam fir causing the development of galls and subsequent

Balsam shootboring sawfly <u>Pleroneura brunneicornis</u> Roh.	Balsam fir	needle loss. Not of great consequence in natural forests but a problem in Christmas tree plantations.
Balsam twig aphid <u>Mindarus abietinus</u> Koch	Balsam fir	Distributed throughout the Maritime Provinces, specific to balsam fir destroying the new shoots. Damage usually localized, not a problem in natural stands but occasionally causes problems in Christmas tree plantations where even modest levels of injury are unacceptable.
Balsam woolly adelgid (previously called balsam woolly aphid) <u>Adelges piceae</u> (Ratz.)	Balsam fir	Distributed throughout the Maritime Provinces, causes needle and shoot distortion, can be a problem in Christmas tree plantations but does not do significant damage in natural forests. Populations are cyclical in abundance.
A bark fungus <u>Lachnellula agassizii</u> (Berk. & Curt.) Dennis	Balsam fir	See text.
Beech bark disease <u>Nectria coccinea</u> var. <u>faginata</u> Lohm., Wats. & Ayers	Beech	Distributed throughout the Maritime Provinces, a saprophyte of little apparent consequence.
Beech scale <u>Cryptococcus fagisuga</u> Lind.	Beech	See text.
Birch casebearer <u>Coleophora serratella</u> (L.)	Speckled alder White birch	Introduced from Europe, this species occurs throughout the Maritime Provinces, prefers white birch but also attacks other species of birch and alder. Twig and branch mortality is common in severe outbreaks and if attack continues unabated, tree mortality may result.
Birch leafminer <u>Fenusa pusilla</u> (Lep.)	White birch Wire birch	An introduced species, occurs throughout the Maritime Provinces attacks birches with a preference

Birch scale <u>Xylococculus betulae</u> (Perg.)	Beech	for wire birch. This insect is a chronic problem for birch causing reduced vigor and predisposing trees to attack by other organisms.
Birch skeletonizer <u>Bucculatrix canadensisella</u> Cham.	Yellow birch	Distributed throughout the Maritime Provinces, attacks birch and beech. Damage to birch and the role of this insect in the beech bark disease complex is still not fully understood.
Blackdotted birch leaftier <u>Nites betulella</u> (Busck)	White birch	Distributed throughout the Maritime Provinces, occurs occasionally in low numbers, of no economic importance.
Black knot of cherry <u>Apiosporina morbosa</u> (Schw. ex Fr.) Arx	Cherry	Distributed throughout the Maritime Provinces, attacks species of cherry and plum, causing twig, branch, and upper crown mortality. Infections reduce fruit production and through reduced tree growth and stem cankering interferes with wood production in black cherry, a scarce and highly prized species used in furniture making.
A black mold <u>Aureobasidium pullulans</u> (de By.) Arnaud	Red pine	Distributed throughout the Maritime Provinces, a secondary fungus of no importance.
Blue spruce sawfly <u>Cephalcia fascipennis</u> (Cress.)	White spruce	Distributed throughout the Maritime Provinces, attacks spruce with a preference for Colorado blue spruce. Occurs occasionally on forest trees but is more often a pest of ornamental trees and hedges.
Bruce spanworm <u>Operophtera bruceata</u> (Hlst.)	Apple Red maple Sugar maple	Distributed throughout the Maritime Provinces, attacks a variety of deciduous hosts, with a preference for maple, beech and aspen.

A canker <u>Aleurodiscus</u> sp.	Balsam fir	A few outbreaks of severe intensity have occurred in some areas of the Region, but have been of short duration, brought under control by natural factors.
Cedar leaf blight <u>Didymascella thujina</u> (Durand) Maire	Eastern white cedar	Distributed throughout the Maritime Provinces, may damage or kill seedlings or saplings, can be particularly damaging in nurseries or other situations of high humidity.
Coral canker <u>Nectria cinnabarina</u> (Tode ex Fr.) Fr.	Chinese elm	Distributed throughout the Maritime Provinces, occurs on a wide variety of deciduous trees and shrubs, a saprophyte occasionally weakly parasitic causing cankers around wounds and at the base of dead branches.
Cytospora canker <u>Valsa sordida</u> Nits.	Lombardy poplar	Found at points scattered throughout much of the Maritime Provinces, causes cankers on poplar, willow, and occasionally on some other hardwoods, can be a problem on ornamentals but of no consequence in forest stands.
Dagger moth <u>Acronicta interrupta</u> Gn.	White birch	Distributed throughout the Maritime Provinces, attacks a variety of deciduous hosts, of no economic importance.
Dashlined looper <u>Protoboarmia porcelaria</u> <u>indicataria</u> (Wlk.)	Balsam fir	Distributed throughout the Maritime Provinces, attacks a variety of coniferous hosts, common but occurring in low numbers and not causing significant damage.
Diamond backed conifer looper <u>Hypagyrtis piniata</u> (Pack.)	Balsam fir White spruce	Distributed throughout the Maritime Provinces, attacks a variety of coniferous hosts, common but occurring in low numbers and not causing significant damage.

Dothichiza canker of poplar <u>Cryptodiaporthe populae</u> (Sacc.) & Butin	Lombardy poplar	Distributed throughout much of of western and southern New Brunswick, western Nova Scotia, and throughout Prince Edward Island, probably an European introduction. Infects a variety of poplar, a virulent organism which attacks the trunk, limbs, and twigs of its host. Tree mortality occurs as a result of gradual weakening.
Dusky leafroller <u>Amorbia humerosana</u> Clem.	Balsam fir	Distributed throughout the Maritime Provinces, a general feeder of no economic importance.
Dusky leafroller <u>Orthotaenia undulana</u> (D. & S.)	Apple	Distributed throughout the Maritime Provinces, attacks a variety of deciduous trees, occurs commonly, usually in low numbers.
Early brown looper <u>Eupithecia filmata</u> Pears.	White spruce	Distributed throughout the Maritime Provinces, attacks a variety of coniferous hosts, occurs commonly but in low numbers.
Eastern dwarf mistletoe <u>Arceuthobium pusillum</u> Peck	Black spruce	Distributed throughout the Maritime Provinces, attacks various spruces, with a preference for black spruce. Tamarack may occasionally be affected. Particularly common in wet, boggy sites. Causes occasional tree mortality.
European larch canker <u>Lachnellula willkommii</u> (Hartig) Dennis	Tamarack	Distributed throughout much of southeastern New Brunswick and mainland Nova Scotia, of European origin. First discovered in the Maritimes in 1980 but evidence indicates its presence for about two decades. Specific to larch and known to be capable of causing tree mortality, particularly in young stands. Its behavior under Maritime climatic conditions is under study.
European pine shoot moth <u>Rhyacionia buoliana</u> (D. & S.)	Mugho pine Red pine	This introduced species attacks all species of pine with a preference for red and Scots pine. It is mainly a problem in plantations and on ornamentals in Nova Scotia

European spruce sawfly <u>Gilpinia hercyniae</u> (Htg.)	White spruce	and Prince Edward Island. In New Brunswick populations have been kept in check by winter larval mortality caused by low temperatures.
Fall cankerworm <u>Alsophila pometaria</u> (Harr.)	Apple White birch	An European introduction this species feeds on spruce. Past outbreaks caused severe damage over large areas until it was brought under control by an accidentally introduced disease and introduced parasites. Populations remain low and damage insignificant. Distributed throughout the Maritime Provinces.
Fall spruce needle moth <u>Argyrotaenia occultana</u> Free.	Balsam fir	Distributed throughout the Maritime Provinces, attacks a wide variety of deciduous hosts with a preference for Manitoba maple. A common defoliator often occurring at damaging levels.
Fall webworm <u>Hyphantria cunea</u> (Dru.)	Apple Beech	Distributed throughout the Maritime Provinces, attacks a wide variety of coniferous hosts, of no economic importance.
False looper <u>Syngrapha</u> sp.	Balsam fir White spruce	Distributed throughout the Maritime Provinces, a late summer webmaker, attacks a wide variety of deciduous hosts, a greater problem on ornamentals than on forest trees.
Fir harlequin <u>Elaphria versicolor</u> (Grt.)	White spruce	Distributed throughout the Maritime Provinces, attacks a variety of coniferous hosts, common but occurring in low numbers and not causing significant damage.
Fir needle inchworm <u>Eupithecia luteata</u> Pack.	Balsam fir White spruce	Distributed throughout the Maritime Provinces, a general feeder, of no economic importance.
		Distributed throughout the Maritime Provinces, common but occurring in low numbers and not causing significant damage.

Forest tent caterpillar <u>Malacosoma disstria</u> Hbn.	Trembling aspen	Distributed throughout the Maritime Provinces, attacks a wide variety of hosts but prefers trembling aspen. This insect is cyclical in abundance, the periods between, and duration of outbreaks are indeterminate. Outbreaks are often widespread and very conspicuous with complete defoliation over large areas. Extensive tree mortality has not occurred but reduced tree vigor with twig and branch mortality is common.
Foureyed spruce bark beetle <u>Polygraphus rufipennis</u> (Kby.)	White spruce	Distributed throughout the Maritime Provinces, attacks a variety of coniferous hosts with a preference for spruce and tamarack. Usually of secondary importance in slash and dead or dying trees but has the ability to become primary.
Fringed looper <u>Campaea perlata</u> (Gn.)	Apple	Distributed throughout the Maritime Provinces, a general feeder, of no economic importance.
Fruittree leafroller <u>Archips argyrospila</u> (Wlk.)	White birch	Distributed throughout the Maritime Provinces, attacks a variety of deciduous trees, occasionally locally abundant, more a problem in orchards than forests.
Gall mites <u>Eriophyes</u> spp.	Beech Speckled alder Sugar maple Wild plum Yellow birch	Several species of mites attack a variety of deciduous hosts causing leaf discoloration, but rarely significant damage.
Gray spruce looper <u>Caripeta divisata</u> Wlk.	White spruce	Distributed throughout the Maritime Provinces, attacks a variety of coniferous hosts, of no economic importance.
Green fruitworm <u>Lithopane antennata</u> (Wlk.)	Apple	Distributed throughout the Maritime Provinces, attacks a variety of deciduous hosts but occurs most commonly on apple, of no economic importance.
Greenheaded spruce sawfly <u>Pikonema dimmockii</u> (Cress.)	White spruce	Distributed throughout the Maritime Provinces, attacks spruce, common but not causing significant damage.

Greenstriped mapleworm <u>Dryocampa rubicunda</u> <u>rubicunda</u> (F.)	Sugar maple	Distributed throughout the Maritime Provinces, attacks red and sugar maple. Localized epidemics occur periodically, affecting syrup production, causing heavy defoliation, and sometimes tree mortality. Past outbreaks were brought under control by naturally occurring biological agencies.
Gypsy moth <u>Lymantria dispar</u> (L.)	Pheromone traps	See text.
Hemlock looper <u>Lambdina fiscellaria</u> <u>fiscellaria</u> (Gn.)	Balsam fir White spruce	Distributed throughout the Maritime Provinces, attacks a variety of coniferous and deciduous hosts. Severe damage, sometimes resulting in mortality of the preferred host, balsam fir has occurred in some areas.
A jelly fungus <u>Auricularia auricula</u> (Hook.) Underw.	Spruce	Distributed throughout the Maritime Provinces, occurs on dead material only, of no importance.
Lady beetle <u>Mulsantina hudsonica</u> Csy.	White spruce	Distributed throughout the Maritime Provinces, attacks other insects but prefers aphids, a beneficial insect.
Larch casebearer <u>Coleophora laricella</u> (Hbn.)	Tamarack	An introduced species firmly established throughout the Maritime Provinces, this species feeds on both native and exotic larch. Second only to the larch sawfly in impact on its host, this species often occurs in damaging numbers.
Larch sawfly <u>Pristiphora erichsonii</u> (Htg.)	Tamarack	Distributed throughout the Maritime Provinces, attacks all species of larch both native and introduced. Periodic outbreaks occur over large areas causing extensive tree mortality. Considered the most destructive insect attacking tamarack.
Large aspen tortrix <u>Choristoneura conflictana</u> (Wlk.)	Apple	Distributed throughout the Maritime Provinces, attacks a variety of deciduous hosts with a preference for trembling aspen. High populations and levels of leafrolling have occurred at times in many parts of the Region.

Late birch leaf edgeminer <u>Heterarthrus nemoratus</u> (Fall.)	White birch	Distributed throughout the Maritime Provinces, an introduced species which at times has caused severe foliage browning in some parts of the Region.
Leaf blister <u>Taphrina carnea</u> Johanson	Yellow birch	Distributed throughout the Maritime Provinces, attacks birch. Most serious after a cool, wet spring when early defoliation and growth loss may occur.
Leaf chafer <u>Dichelonyx</u> sp.	White birch	Distributed throughout the Maritime Provinces. Adults feed on foliage and larvae on roots of a variety of deciduous trees, of no economic importance.
Leafhopper <u>Oncopsis</u> sp.	Yellow birch	Distributed throughout the Maritime Provinces, attacks birch, of no known economic importance.
Leaf and twig blight of aspen <u>Venturia macularis</u> (Fr.) E. Muell. & Arx	Largetooth aspen Trembling aspen	Distributed throughout the Maritime Provinces, attacks poplars killing the new shoots and leaves, often common and conspicuous but does not cause significant damage.
Leaf spot <u>Phleospora aceris</u> (Lib.) Sacc.	Sugar maple	Distributed throughout the Maritime Provinces, attacks maple, damage insignificant.
Leaf spot <u>Phyllosticta minima</u> (Berk. & Curt.) Underw. & Earle	Sugar maple	Distributed throughout the Maritime Provinces, attacks maple, usually of little importance.
Leaf spot <u>Septoria betulina</u> Pass.	White birch	Distributed throughout the Maritime Provinces. The disease is implicated in the general deterioration of birch along the Bay of Fundy coast particularly in New Brunswick where leaf browning and premature leaf drop has been common for several years.
Lesser maple spanworm <u>Itame pustularia</u> (Gn.)	Red maple	Distributed throughout the Maritime Provinces, mainly a pest of red maple. Periodic outbreaks have occurred causing tree mortality in some localized areas.

Linden looper <u>Erannis tiliaria</u> (Harr.)	Sugar maple	Distributed throughout the Maritime Provinces, attacks a variety of deciduous hosts occasionally causing damage.
Lonchaeid fly <u>Lonchaea corticus</u> Tayl.	Jack pine	Probably distributed throughout the Maritime Provinces, found in trees attacked by the white pine weevil, it feeds as a scavenger or predator.
Longhorned sawyer beetles <u>Monochamus</u> sp.	White spruce	Distributed throughout the Maritime Provinces, attacks a variety of coniferous hosts. Adults produce broods in decadent or recently dead trees and feed on the bark of living twigs. With the large areas of timber attacked by the spruce budworm, sawyer beetles have become very abundant.
Looper <u>Aethalura intertexta fumata</u> B. & McD.	White birch	A solitary defoliator of rare occurrence.
Looper <u>Eupithecia fletcherata</u> Tayl.	White spruce	Distributed throughout the Maritime Provinces, feeds on a variety of coniferous hosts, of no economic importance.
Maple leafroller <u>Sparganothis acerivorana</u> Mack.	Red maple	Distributed throughout the Maritime Provinces, feeds on various species of maple but prefers red maple, a host which it attacks persistently, sometimes resulting in tree damage.
Maple bladdergall mite <u>Vasates quadripes</u> (Shim.)	Sugar maple	Distributed throughout the Maritime Provinces, galls often common and conspicuous, not causing significant damage.
Maple spindlegall mite <u>Vasates aceris-crumena</u> (Rly.)	Sugar maple	Distributed throughout the Maritime Provinces, galls often conspicuous not causing significant damage.
Maple trumpet skeletonizer <u>Epinotia aceriella</u> (Clem.)	Sugar maple	Distributed throughout the Maritime Provinces, attacks sugar, and red maple, of no economic importance.

Mountain-ash sawfly <u>Pristiphora geniculata</u> (Htg.)	American mountain-ash	Distributed throughout the Maritime Provinces. In addition to American mountain-ash and its cultivars, European mountain-ash is also attacked, all hosts are often severely defoliated.
Mourningcloak butterfly <u>Nymphalis antiopa</u> (L.)	Willow	Distributed throughout the Maritime Provinces, attacks a variety of deciduous hosts but prefers elm, willow and poplar. This insect is a problem of ornamental rather than forest trees.
Needle cast <u>Lirula mirabilis</u> (Darker) Darker	Balsam fir	Distributed throughout the Maritime Provinces, attacks the needles of balsam fir, light infections cause little damage but severe infections degrade Christmas trees, may reduce growth, and kill young seedlings.
Needle cast <u>Lirula nervata</u> (Darker) Darker	Balsam fir	Distributed throughout the Maritime Provinces, attacks the needles of balsam fir, light infections cause little damage, but severe infections degrade Christmas trees, may reduce growth and kill young seedlings.
A needle and cone rust <u>Pucciniastrum americanum</u> (Farl.) Arth.	White spruce	Probably distributed throughout the Maritime Provinces. A cone and needle rust that recently caused considerable damage to the white spruce seed crop over much of New Brunswick.
Needle fungus <u>Kabatiella balsameae</u> (J.J. Davis) Arx	Balsam fir	Distributed throughout the Maritime Provinces, probably secondary on needles, of no importance.
Needle fungus <u>Phaeocryptopus nudus</u> (Peck) Petr.	Balsam fir	Distributed throughout the Maritime Provinces, found on balsam fir needles, of no economic importance.
A needle fungus <u>Sydowia polyspora</u> (Bref. and Tav.) Muller	Jack pine	Distributed throughout the Maritime Provinces, attacks a variety of conifers, of secondary importance.

Needle rust <u>Chrysomyxa ledi</u> DBy.	White spruce	Distributed throughout the Maritime Provinces, attacks spruce with labrador tea as an alternate host, may cause localized problems but serious damage is rare.
Needle rust <u>Chrysomyxa ledicola</u> Lagh.	Red spruce	Distributed throughout the Maritime Provinces, alternates between spruce and labrador tea, may cause localized problems but serious damage is rare.
Needle rust <u>Chrysomyxa weirii</u> Jacks.	Red spruce	Limited distribution in New Brunswick and Nova Scotia, attacks spruce, may cause localized problems but no serious damage has been reported.
A needle rust <u>Pucciniastrum epilobii</u> Otth	Balsam fir	Distributed throughout the Maritime Provinces, balsam fir is the coniferous host and the broad-leaved alternate is fireweed, only serious when severe on young trees and seedlings.
Needle rust or Witches'-broom <u>Pucciniastrum goeppertianum</u> (Kuehn) Kleb.	Balsam fir Blueberry	Distributed throughout the Maritime Provinces, balsam fir is the coniferous host, while the broad-leaved alternate is blueberry, only serious when severe on young trees or seedlings, may reduce blueberry production.
Needle rust <u>Uredinopsis osmundae</u> Magn.	Balsam fir	Distributed throughout the Maritime Provinces, balsam fir is the coniferous host and a species of fern the alternate host, does not have an economic impact on wood production.
Northern pitch twig moth <u>Petrova albicapitana</u> (Busck)	Jack pine	Distributed throughout the Maritime Provinces wherever its primary host, jack pine, is found, also occasionally found on other pine species. This insect feeds on bark and wood and causes the development of pitch nodules, which results in twig and branch deformation and mortality and occasionally tree death.
November moth <u>Epirrita autumnata henshawi</u> (Swett)	Balsam fir	Distributed throughout the Maritime Provinces, attacks a variety of coniferous hosts, of no economic importance.

Obliquebanded leafroller <u>Choristoneura rosaceana</u> (Harr.)	Apple Red maple White birch	Distributed throughout the Maritime Provinces, attacks a wide variety of deciduous hosts, occurs commonly; of more economic importance in orchards than in forests.
Ocellate gall midge <u>Acericecis ocellaris</u> (O.S.)	Red maple Sugar maple	Distributed throughout the Maritime Provinces, common often conspicuously so, but not causing significant damage.
Orange spruce needleminer <u>Coleotechnites piceaella</u> (Kft.)	Balsam fir Red spruce White spruce	Distributed throughout the Maritime Provinces, mines needles of spruce and fir, common but not abundant enough to cause significant damage.
Owlet moth <u>Idia americalis</u> (Gn.)	White spruce	Distributed throughout the Maritime Provinces, attacks spruce and balsam fir, of no economic importance.
Owlet moth <u>Lithophane innominata</u> (Sm.)	Yellow birch	Probably distributed throughout the Maritime Provinces, attacks a variety of hosts but prefers cherry, reported in low numbers only.
Parasite on black knot of cherry <u>Phaeostoma sphaerophila</u> (Peck) Barr	Pin cherry	Distributed throughout much of the of the Maritime Provinces, a fungal parasite of black knot of cherry.
Pine adelgid <u>Pineus coloradensis</u> Gill.	Scots pine	Probably distributed throughout the Maritime Provinces, attacks several species of pine, not often recorded.
Pine leaf adelgid <u>Pineus pinifoliae</u> (Fitch)	Eastern white pine	Distributed throughout the Maritime Provinces, the insect alternates between spruce, where cone-like galls are formed, to white pine where heavy feeding on the shoots may cause extensive tree damage.
Pine bark adelgid <u>Pineus strobi</u> (Htg.)	Jack pine	Distributed throughout the Maritime Provinces, prefers eastern white pine but will attack other species. Trees with a heavy infestation will have the stems covered by woolly material. Stem attack is conspicuous but rarely damaging.

Rowdery mildew <u>Phyllactinia guttata</u> (Fr.) Lev.	White birch	Distributed throughout the Maritime Provinces, found on a wide variety of deciduous trees, seldom a serious problem, severe levels of infection may cause premature leaf drop.
Red leaf <u>Exobasidium vaccinii</u> Wor.	Miscellaneous shrubs	Found in scattered locations throughout the Maritime Provinces, attacks a variety of shrubs, of no significance in forestry.
Redlined conifer caterpillar <u>Feralia jocosa</u> (Gn.)	Balsam fir Spruce	Distributed throughout the Maritime Provinces, attacks a variety of coniferous hosts, common but occurring in low numbers and not causing significant damage.
Redstriped needleworm <u>Griselda radicana</u> Heinr.	White spruce	Distributed throughout the Maritime Provinces, attacks mainly balsam fir and spruce, common but occurring in low numbers, causes no significant damage.
Rusty tussock moth <u>Orgyia antiqua</u> (L.)	White birch Yellow birch	Distributed throughout the Maritime Provinces, a general feeder with a preference for balsam fir. This insect is found commonly sometimes in association with the whitemarked tussock moth but has rarely caused significant defoliation.
Rusty whitesided caterpillar <u>Orthosia revicta</u> (Morr.)	Apple White birch	Distributed throughout the Maritime Provinces, attacks a variety of deciduous hosts, occurring in low numbers and not causing significant damage.
Saddleback looper <u>Ectropis crepuscularia</u> (D. & S.)	Balsam fir	A general feeder which occurs throughout the Maritime Provinces. Localized outbreaks occur occasionally resulting in severe defoliation, but have been of short duration.
Saddled prominent <u>Heterocampa guttivitta</u> (Wlk.)	Sugar maple White birch	Distributed throughout the Maritime Provinces, beech and sugar maple are the preferred hosts but other hardwoods may also be attacked. Since 1970 several outbreaks have occurred in various areas of the Region, but have been of short duration and brought

Scleroderris canker of pine <u>Gremmeniella abietina</u> (Lagerb.) Morelet	Jack pine Red pine	under control by natural factors. Tree damage and mortality have resulted from these attacks.
Sirococcus shoot blight of conifers <u>Sirococcus conigenus</u> (DC) P. Cannon & Minter	Red pine	Distributed throughout much of New Brunswick, consists of a complex of North American, European, and intermediate races, capable of causing branch mortality, and in young plantations trees may be killed, usually a pest of pine but known to attack spruce.
Small conifer looper <u>Eupithecia transcanadata</u> MacK.	White spruce	Distributed throughout the Maritime Provinces, attacks a variety of coniferous hosts, common but occurring in low numbers and not causing significant damage.
Speckled tar spot <u>Rhytisma punctatum</u> Pers. ex Fr.	Manitoba maple Mountain maple	Distributed throughout the Maritime Provinces, attacks maple causing black spots on leaves.
Spiny looper <u>Phigalia titea</u> (Cram.)	White birch	Distributed throughout the Maritime Provinces, attacks a variety of deciduous hosts, common but not causing significant damage.
Spittle bugs <u>Aphrophora</u> spp.	Mugho pine	Distributed throughout the Maritime Provinces, attacks a variety of coniferous hosts, sometimes causing damage.
Spotted tussock moth <u>Lophocampa maculata</u> Harr.	White birch	Distributed throughout the Maritime Provinces, attacks a variety of deciduous hosts, but shows a preference for willow, common but occurring in low numbers and causing no significant damage.

<p>Spruce beetle <u>Dendroctonus rufipennis</u> (Kby.)</p>	<p>White spruce</p>	<p>Attacks mainly mature and over-mature trees principally white spruce. High levels of mortality have occurred in Nova Scotia and Prince Edward Island, with only a few small infestations in New Brunswick.</p>
<p>Spruce budmoth <u>Zeiraphera canadensis</u> Mut. & Free.</p>	<p>White spruce</p>	<p>Distributed throughout the Maritime Provinces, mainly a pest of open-grown white spruce such as plantations where serious damage has occurred.</p>
<p>Spruce budworm <u>Choristoneura fumiferana</u> (Clem.)</p>	<p>Balsam fir Spruce</p>	<p>See Text and Table 1.</p>
<p>Spruce cone maggot <u>Hylemya anthracina</u> (Czerny)</p>	<p>White spruce</p>	<p>Distributed throughout the Maritime Provinces, attacks the cones of spruce, constructing a spiral feeding tunnel around the cone axis, damaging both scales and seeds. Heavy seed losses have occurred at many locations in the Region.</p>
<p>Spruce cone rust <u>Chrysomyxa pirolata</u> Wint.</p>	<p>White spruce</p>	<p>Distributed throughout the Maritime Provinces, attacks the cones of spruce and may cause serious seed loss, wintergreens serve as alternate hosts.</p>
<p>Spruce coneworm <u>Dioryctria reniculelloides</u> Mut. & Mun.</p>	<p>Black spruce Red spruce White spruce</p>	<p>Distributed throughout the Maritime Provinces, attacks the new foliage and cones of spruce and to a lesser extent balsam fir. This species is sometimes very abundant and damaging.</p>
<p>Spruce-fir looper <u>Semiothisa signaria</u> <u>dispuncta</u> (Wlk.)</p>	<p>White spruce</p>	<p>Distributed throughout the Maritime Provinces, attacks a variety of coniferous hosts with a preference for white spruce and balsam fir, common but causing no significant damage.</p>
<p>Spruce harlequin <u>Palthis angulalis</u> (Hbn.)</p>	<p>White spruce</p>	<p>Distributed throughout the Maritime Provinces, attacks a variety of coniferous hosts, common but occurring in low numbers and causing no significant damage.</p>

Spruce micro moth <u>Coleotechnites atrupictella</u> (Dietz.)	Balsam fir White spruce	Distributed throughout the Maritime Provinces, attacks a variety of coniferous hosts, and exhibits a number of feeding habits but is principally a needle miner of white spruce, of no economic importance.
Spruce needleworm <u>Herculia thymetusalis</u> (Wlk.)	White spruce	Distributed throughout the Maritime Provinces, attacks a variety of coniferous hosts, occurring occasionally in low numbers and causing no significant damage.
Sugar maple borer <u>Glycobius speciosus</u> (Say)	Maple	Probably distributed throughout the Maritime Provinces wherever the preferred host, sugar maple, is found. Considered the most serious pest of sugar maple in the Region, causing reduced vigor, branch, and sometimes tree mortality.
Tar spot <u>Rhytisma acerinum</u> (Pers. ex St. Amans) Fr.	Red maple	Distributed throughout the Maritime Provinces, attacks red maple, sugar maple and silver maple, causes thickened black spots on leaves.
Tar spot <u>Rhytisma salicinum</u> Pers. ex Fr.	Willow	Distributed throughout the Maritime Provinces, attacks willow causing thickened black spots on leaves.
Tip blight of balsam fir <u>Delphinella balsameae</u> (Waterm.) E. Muell.	Balsam fir	Reported from scattered locations throughout New Brunswick and Nova Scotia, attacks the current shoots of balsam fir, may be damaging in Christmas tree plantations and on ornamentals.
Transverse banded looper <u>Hydriomena divisaria</u> (Wlk.)	White spruce	Distributed throughout the Maritime Provinces, attacks a variety of coniferous hosts, common in low numbers and not causing significant damage.
Transverse lady beetle <u>Coccinella transversoguttata</u> <u>richardsoni</u> Brown	Red pine	Distributed throughout the Maritime Provinces, a predator on aphids and other insects.
Underwing moth <u>Catocala</u> sp.	Apple	Distributed throughout the Maritime Provinces, attacks a variety of deciduous trees and ground plants, of no economic importance.

Unicorn caterpillar <u>Schizura unicornis</u> (J.E. Smith)	Yellow birch	An uncommon species reported from a number of locations in New Brunswick and Nova Scotia, of no economic importance.
Wandering sawfly <u>Dimorphopteryx pinguis</u> (Nort.)	White birch	Distributed throughout the Maritime Provinces, attacks birch and alder, severe defoliation has occurred at a few locations in the Region.
Whitemarked tussock moth <u>Orgyia leucostigma</u> (J.E. Smith)	Balsam fir Speckled alder White birch	Distributed throughout the Maritime Provinces, a general feeder that occurs in outbreak numbers periodically and causes extensive damage resulting in some tree mortality. Outbreaks are brought under control by natural factors.
White pine blister rust <u>Cronartium ribicola</u> J.C. Fischer	Currant Eastern white pine	Distributed throughout the Maritime Provinces, eastern white pine is the coniferous host and currants and gooseberries the alternate host for this introduced disease. Found scattered in pine stands and on individual trees causing branch, partial crown, and sometimes whole tree mortality.
Willow blight <u>Venturia saliciperda</u> Neusch	Weeping willow	Distributed throughout the Maritime Provinces, attacks willow, not important in forest stands but damaging to ornamentals and trees in shelterbelts. Damage can result in defoliation, twig and branch mortality and if the disease persists, eventually tree death.
Winter moth <u>Operophtera brumata</u> (L.)	Apple	See text.
Witches'-broom <u>Taphrina wiesnerii</u> (Rathay) Mix	Black cherry	Distributed throughout much of New Brunswick and Nova Scotia, found in Prince County, Prince Edward Island, attacks cherry, most serious during a cool wet spring when early defoliation and growth loss may occur.
Witch hazel gall aphid <u>Hamamelistes spinosus</u> Shim.	White birch Yellow birch	This species alternates between birch and witch hazel. Attacks on witch hazel cause the development of bud galls and on birch

<p>Wood decay fungi</p> <p><u>Coriolellus variiformis</u> (Pk.) Sarkar</p> <p><u>Fomes cajanderi</u> Karst.</p> <p><u>Fomes fomentarius</u> (L. ex Fr.) Kickx</p> <p><u>Hyphoderma setigerum</u> (Fr.) Donk</p> <p><u>Merulius tremellosus</u> Schrad. ex Fr.</p> <p><u>Polyporus dryophilus</u> Berk.</p> <p><u>Polyporus hirsutus</u> Wulf. ex Fr.</p> <p><u>Polyporus schweinitzii</u> Fr.</p> <p><u>Poria ferruginosa</u> (Schrad. ex Fr.) Karst.</p> <p><u>Pycnoporus cinnabarinus</u> (Jacq. ex Fr.) Karst.</p> <p><u>Stereum ostrea</u> (Blume & Nees ex Fr.) Fr.</p>	Miscellaneous	<p>Decay fungi decompose woody tissues and depending on their chemical action cause either brown or white rots. Some are specific to conifers others to hardwoods. Still others decay both groups of trees. They are one of the economically most important group of fungi but through their action of decomposing dead wood they are also one of the most beneficial by recycling nutrients into the ecosystem.</p>
<p>Yellow birch leaffolder</p> <p><u>Ancyliis discigerana</u> (Wlk.)</p>	Yellow birch	<p>Distributed throughout the Maritime Provinces, attacks birch, of no economical importance.</p>
<p>Yellowheaded spruce sawfly</p> <p><u>Pikonema alaskensis</u> (Roh.)</p>	White spruce	<p>Distributed throughout the Maritime Provinces, attacks spruce, particularly damaging in young open-grown plantations where severe levels of defoliation may occur.</p>
<p>Yellowlined conifer looper</p> <p><u>Cladara limitaria</u> (Wlk.)</p>	Balsam fir	<p>Distributed throughout the Maritime Provinces, attacks a variety of coniferous hosts, common but occurring in low numbers and causing no significant damage.</p>
<p>Yellow witches'-broom of balsam fir</p> <p><u>Melampsorella caryophyllacearum</u> Schroet.</p>	Balsam fir	<p>Distributed throughout the Maritime Provinces, chickweed the alternate host, serious only in Christmas tree plantations where trees may be disfigured.</p>
<p>Yellow witches'-broom of spruce</p> <p><u>Chrysomyxa arctostaphyli</u> Diet.</p>	Red spruce	<p>More widely distributed in Nova Scotia than in New Brunswick, bearberry is the broad-leaved host; may occasionally be a problem on individual trees.</p>

Appendix 2

Moths captured in the Fundy National Park Light Trap 1977-1986

Common and scientific name	Remarks
Alder dagger moth <u>Acronicta dactylina</u> Grt.	Distributed throughout the Maritime Provinces, attacks a variety of deciduous hosts, of no economic importance.
Apple sphinx <u>Sphinx gordius</u> Cram.	Distributed throughout the Maritime Provinces, prefers apple but is found occasionally on other deciduous hosts, of no economic importance.
Big poplar sphinx <u>Pachysphinx modesta</u> (Harr.)	Distributed throughout the Maritime Provinces, attacks a variety of deciduous hosts with a preference for poplar and willow, of no economic importance.
Birch caterpillar <u>Peridea ferruginea</u> (Pack.)	Distributed throughout the Maritime Provinces, attacks a variety of deciduous hosts with a preference for birch, of no economic importance.
Birch dagger moth <u>Acronicta innotata</u> Gn.	Distributed throughout the Maritime Provinces, attacks a variety of deciduous hosts with a preference for birch, of no economic importance.
Blackcheeked aspen caterpillar <u>Ipimorpha pleonectusa</u> Grt.	Distributed throughout the Maritime Provinces, attacks poplars and willows, of no economic importance.
Blindeyed sphinx <u>Paonias excaecatus</u> (J.E. Smith)	Distributed throughout the Maritime Provinces, attacks a variety of deciduous hosts of no economic importance.
Bruce spanworm <u>Operophtera bruceata</u> (Hlst.)	See Appendix 1.
Cecropia moth <u>Hyalophora cecropia</u> (L.)	Distributed throughout the Maritime Provinces, attacks a variety of deciduous hosts of no economic importance.
Climbing cherry cutworm <u>Crocigrapta normani</u> (Grt.)	Distributed throughout the Maritime Provinces, attacks a variety of deciduous hosts, of no economic importance.
Cutworm <u>Eurois occulta</u> (L.)	Distributed throughout the Maritime Provinces, a general feeder with a preference for larch, of no economic importance.

Dashlined looper <u>Protoboarmia porcelaria</u> <u>indicataria</u> (Wlk.)	See Appendix 1.
Duskyback leafroller <u>Archips mortuana</u> Kft.	A solitary leafroller of deciduous hosts, of rare occurrence.
Eastern tent caterpillar <u>Malacosoma americanum</u> (F.)	Distributed throughout the Maritime Prov- inces, nests often common on roadside trees and bushes.
European leafroller <u>Archips rosana</u> (L.)	Distributed throughout the Maritime Prov- inces, attacks a variety of deciduous hosts, of no economic importance.
European pine shoot moth <u>Rhyacionia buoliana</u> (D. & S.)	See Appendix 1.
Fall cankerworm <u>Alsophila pometaria</u> (Harr.)	See Appendix 1.
Fall webworm <u>Hyphantria cunea</u> (Dru.)	See Appendix 1.
False hemlock looper <u>Nepytia canosaria</u> (Wlk.)	Distributed throughout the Maritime Prov- inces, attacks a variety of coniferous hosts, of no economic importance.
False hornworm <u>Pheosia rimosa</u> Pack.	Distributed throughout the Maritime Prov- inces, attacks poplar and willow, of no economic importance.
Filament bearer <u>Nematocampa limbata</u> (Haw.)	Distributed throughout the Maritime Prov- inces, a general feeder with a preference for balsam fir, occasionally locally abun- dant, of little economic importance.
Flanged looper <u>Nemoria mimosaria</u> (Gn.)	Distributed throughout the Maritime Prov- inces, a general feeder of no economic importance.
Forest tent caterpillar <u>Malacosoma disstria</u> Hbn.	See Appendix 1.
Fringed looper <u>Campaea perlata</u> (Gn.)	See Appendix 1.
Fruittree leafroller <u>Archips argyrospila</u> (Wlk.)	See Appendix 1.
Giant tigermoth <u>Platarctia parthenos</u> (Harr.)	Distributed throughout the Maritime Prov- inces, attacks a variety of deciduous hosts, of no economic importance.

- Gray spruce looper
Caripeta divisata Wlk. See Appendix 1.
- Greenstriped mapleworm
Dryocampa rubicunda rubicunda (F.) See Appendix 1.
- Hemlock looper
Lambdina fiscellaria fiscellaria
(Gn.) See Appendix 1.
- Jack pine budworm
Choristoneura pinus pinus Free. Distributed throughout the Maritime Provinces, attacks pines with a preference for jack pine. Occurs occasionally in outbreak numbers.
- Larch lappet moth
Tolype laricis (Fitch) Distributed throughout the Maritime Provinces, attacks a variety of coniferous hosts, with a preference for white spruce and balsam fir, of no economic importance.
- Large aspen tortrix
Choristoneura conflictana (Wlk.) See Appendix 1.
- Large maple spanworm
Prochoerodes transversata (Dru.) Distributed throughout the Maritime Provinces, attacks a variety of deciduous hosts, of no economic importance.
- Lesser maple spanworm
Itame pustularia (Gn.) See Appendix 1.
- Linden looper
Erannis tiliaria (Harr.) See Appendix 1.
- Looper
Lomographa vestaliata (Gn.) Distributed throughout the Maritime Provinces, attacks a variety of deciduous hosts, of no economic importance.
- Looper
Besma quercivoraria (Gn.) Distributed throughout the Maritime Provinces, attacks a variety of deciduous hosts with a preference for birch, of no economic importance.
- Looper
Cyclophora pendulinaria (Gn.) Distributed throughout the Maritime Provinces, attacks balsam fir and white spruce of no economic importance.
- Looper
Eulithis explanata (Wlk.) Distributed throughout the Maritime Provinces, attacks balsam fir and white spruce, of no economic importance.
- Looper
Tetracis crocallata Gn. Distributed throughout the Maritime Provinces, attacks willow, of no economic importance.

- Maple leafroller
Sparganothis acerivorana MacK. See Appendix 1.
- Maple spanworm
Ennomos magnaria Gn. Distributed throughout the Maritime Provinces, attacks a variety of deciduous hosts, of no economic importance.
- Masked birch caterpillar
Drepana arcuata Wlk. Distributed throughout the Maritime Provinces, attacks birch and alder with a preference for white birch, of no economic importance.
- Needletier
Sparganothis reticulatana (Clem.) Probably distributed throughout the Maritime Provinces, a general feeder, of no economic importance.
- November moth
Epirrita autumnata henshawi (Swett) See Appendix 1.
- Oak leaf shredder
Croesia semipurpurana (Kft.) Distributed throughout the Maritime Provinces, specific to oak, occurs periodically at high population levels when significant damage occurs.
- Obliquebanded leafroller
Choristoneura rosaceana (Harr.) See Appendix 1.
- Omnivorous leafroller
Archips purpurana Clem. Distributed throughout the Maritime Provinces, attacks a variety of deciduous hosts, of no economic importance.
- Owlet moth
Xylotype acadia B. & B. Distributed throughout the Maritime Provinces reported on alder and tamarack, of no economic importance.
- Pepper-and-salt moth
Biston betularia cognataria (Gn.) Distributed throughout the Maritime Provinces, attacks a variety of deciduous hosts, of no economic importance.
- Pinkbarred sawfly
Xanthia togata (Esp.) Distributed throughout the Maritime Provinces, attacks a variety of deciduous hosts with a preference for willow, of no economic importance.
- Polyphemus moth
Antheraea polyphemus (Cram.) Distributed throughout the Maritime Provinces, attacks a variety of deciduous hosts with a preference for white birch, of no economic importance.
- Poplar-and-willow leafroller
Archips myricana McD. Distribution in the Maritimes unknown, attacks deciduous hosts, of no economic importance.

Rearhumped caterpillar <u>Amphipyra pyramidoides</u> Gn.	Distributed throughout the Maritime Provinces, attacks a variety of deciduous hosts, of no economic importance.
Redlined conifer caterpillar <u>Feralia jocosa</u> (Gn.)	See Appendix 1.
Rustylined leaftier <u>Clostera albosigma</u> Fitch	Distributed throughout the Maritime Provinces, attacks poplar and willow, of no economic importance.
Rusty whitesided caterpillar <u>Orthosia revicta</u> (Morr.)	See Appendix 1.
Rusty tussock moth <u>Orgyia antiqua</u> (L.)	See Appendix 1.
Saddleback looper <u>Ectropis crepuscularia</u> (D. & S.)	See Appendix 1.
Saddled prominent <u>Heterocampa guttivitta</u> (Wlk.)	See Appendix 1.
Satin moth <u>Leucoma salicis</u> (L.)	Distributed throughout the Maritime Provinces, introduced from Europe, attacks poplars and willows, usually a pest of ornamentals but sometimes causes complete, localized defoliation in forest stands of aspen.
Smoky moth <u>Eilema bicolor</u> (Grt.)	Distributed throughout the Maritime Provinces, feeds mainly on lichens on coniferous trees, of no economic importance.
Speckled green fruitworm <u>Orthosia hibisci</u> (Gn.)	Distributed throughout the Maritime Provinces, a general feeder, of no economic importance.
Spiny looper <u>Phigalia titea</u> (Cram.)	See Appendix 1.
Spotted aspen leafroller <u>Pseudosciaphila duplex</u> (Wlshm.)	Distributed throughout the Maritime Provinces, a common, often abundant, leafroller of poplar.
Spotted tussock moth <u>Lophocampa maculata</u> Harr.	See Appendix 1.
Spruce budworm <u>Choristoneura fumiferana</u> (Clem.)	See Text and Table 1.
Spruce coneworm <u>Dioryctria reniculelloides</u> Mut. & Mun.	See Appendix 1.

Twin spotted sphinx
Smerinthus jamaicensis (Dru.)

Distributed throughout the Maritime Provinces, attacks willow and poplar, of no economic importance.

Uglynest caterpillar
Archips cerasivorana (Fitch)

Distributed throughout the Maritime Provinces, a common tentmaker on roadside trees and bushes, may be a problem at times in orchards, of no economic importance in forestry.

Warty birch caterpillar
Drepana bilineata (Pack.)

Distributed throughout the Maritime Provinces, attacks white birch, speckled alder, and trembling aspen, of no economic importance.

Whitemarked tussock moth
Orgyia leucostigma (J.E. Smith)

See Appendix 1.

Willow sphinx
Smerinthus cerisyi Kby.

Distributed throughout the Maritime Provinces, attacks poplars and willows, of no economic importance.

Yellowlined caterpillar
Nadata gibbosa (J.E. Smith)

Distributed throughout the Maritime Provinces, attacks a variety of deciduous hosts, of no economic importance.

Yellowlined conifer looper
Cladara limitaria (Wlk.)

See Appendix 1.

Yellow woollybear
Spilosoma virginica (F.)

Distributed throughout the Maritime Provinces, attacks a variety of deciduous hosts, of no economic importance.